

## Effectiveness of Calisthenic Exercise on Sleep Quality among Caregivers of Mentally Disabled Children at Selected Setting

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### Abstract

Caring for a disabled child can make their daily parenting duties, such as feeding, toilet training and getting them to sleep, it will be more challenging. People who are taking care of a mentally disabled child will undergo a major part of stress in their life and so their sleep pattern will get disturbed. However, sleep complaints have been under-treated by caregivers of all ill family members. Calisthenic exercise is a very simple exercise that helps caregivers to improve sleep quality. The research approach was quantitative research and the research design adopted was quasi-experimental control group design. The caregivers of mentally disabled children were selected by purposive sampling technique. The sample size for the study was 80. It is divided into two groups, that is 40 were in the study group and 40 were in the control group. Pittsburgh sleep quality index was used to assess the sleep quality. Confidentiality was maintained throughout the research. The data was analyzed by using descriptive and inferential statistics. The result revealed that during the post-test 25 (62.5%) had good sleep quality. The p-value of 0.001 is less than 0.01 and is highly significant at the 1% level hence it is concluded that there is a high significant difference between the mean sleep quality scores at post-test level in control and study groups. The mean scores of the post-test are lesser than the mean score of pre-test and it is concluded that calisthenic exercise is effective in increasing sleep quality in the study group.

**Keywords:** Calisthenic Exercise, Caregivers, Mentally Disabled Children Sleep Quality

### Introduction

Being a caregiver is a sophisticated healthcare activity that has progressed from a simple family hobby to an important component of healthcare. People who care for mentally challenged children will be stressed, which will interrupt their sleep cycles [1]. Sleep disturbances can have major effects on both physical and mental health. Caregivers for all ailing family members, however, have not fully addressed sleep issues [2]. In today's fast-paced, high-expectation world, stress is thought to have a considerable impact on illness, disease development, and disability in people of all ages. Caregivers are expected to help sick, ageing, or disabled family members. In addition

to personal care and practical aid, families provide emotional support to their mentally ill relatives. As a result, the affected person is completely reliant on the carer, and their performance is governed by the type and intensity of care provided [3]. These responsibilities can cause a great deal of stress and worry for the caretaker, lowering their overall quality of life. Sleep is necessary for the regulation of the endocrine, immune, and thermoregulatory systems, as well as homeostasis, brain plasticity, neurotoxic elimination, cognition, memory, concentration, and performance. Obesity, excessive daytime drowsiness, fatigue, arterial hypertension, diabetes, stroke, and coronary artery disease are all risk factors for sleep loss, which has

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detrimental social and economic effects [4]. This field of study, which only gained popularity in the latter half of the twentieth century, aims to improve sleep hygiene while also detecting sleep problems that impair a person's quality of life. Callisthenics exercises involve straightforward movements to raise the body's core temperature. Fitness aficionados attest to their happier outlook. Some assert that this is due to the stimulation of neurotransmitter release during exercise, which are brain chemicals. Because neurotransmitters are known to control people's moods and emotions, they can make you feel better and less anxious [5]. One can gain more respect and self-assurance by engaging in callisthenics. When the body temperature increases, the body clock awakens. After about 30–90 minutes, the body's core temperature starts to drop. Sleeping is made simpler by the drop [6]. A study was conducted to explore the family caregiver communication difficulties and caregiver quality of life and anxiety. The main objective of the study is to ascertain how caregiver anxiety and quality of life are impacted by inadequate communication between family caregivers and healthcare providers. The data were gathered via a cross-sectional online survey that included 220 caregivers. According to the findings, reading health literacy had less of an impact on caregivers' outcomes than did asking questions [7]. The difficulty of parenting among mothers of children who have a range of emotional, mental, and physical issues. In Isfahan, Iran, 285 mothers of children with chronic medical conditions, psychiatric disorders, sensory-motor impairments, and mental impairments, aged 6 to 12, participated in a cross-sectional study. Mothers of children with chronic medical conditions are more worried as parents than mothers of children with psychiatric illnesses at all educational levels ( $P < 0.05$ ). Mothers of children with sensory-motor deficits in their minds and bodies experience greater parental stress [8]. retardation facilities. To assess stress in parents,

the parental stress scale (PSS) was utilised. Parents of autistic children were extremely stressed. Mothers experience more stress than fathers. The results show that stress levels are high ( $p=0.01$ ) [9]. A thorough examination into sleep disturbance in women from the Subarctic. The study included 29,681 women between the ages of 18 and 69. Overall, serious sleep disruptions were observed in 24.2% of women ( $PSQI > 10$ ). Respondents in the winter showed a greater overall prevalence of severe sleep disorders (PR 1.21; 95% CI, 1.15–1.28) than those who responded in the summer. Women in their early and late middle ages, those who were single, those with kids, those who struggled financially, those who worked shifts, and those with flexible schedules were more likely to have significant sleep issues [10].

## Objectives

1. To assess the pre-test level of sleep quality among caregivers of mentally disabled children in the control and study group.
2. To determine the effectiveness of calisthenic exercise on sleep quality among caregivers of mentally disabled children in the study group.
3. To associate the post-test level of sleep quality of caregivers of mentally disabled children with their demographic variables in the control and study groups.

## Materials and Methods

**Study** The quantitative research approach with a quasi-experimental control group design was used in this study. The population of the study included caregivers of mentally disabled children. The total sample size was 80, which includes 40 in the experimental group and 40 in the control group selected by using the purposive sampling technique. The exclusion criteria were those who were doing regular exercise as a daily routine, caregivers who were mentally incompetent to follow the commands

and caregivers who were paid caretakers of mentally disabled children.

Data collection- The data was collected after receiving formal approval from the IEC department. The investigator selected 80 samples, who fulfilled the inclusion criteria, using a purposive sampling technique. Consent was obtained from each participant. The pretest was done by using the Pittsburgh Sleep Quality Index to assess sleep quality. Then calisthenic exercise was demonstrated to the participants who came to therapy for their disabled children for alternative days. They did the calisthenic exercise for 15 days under the supervision of the investigator and for another 15 days, they practised at home by monitoring the investigator through a WhatsApp group. After 30 days of intervention, the post-test was done by using the same tools. The investigator maintained good interpersonal relationships with the caregivers of mentally disabled children throughout the study.

Statistical Analysis-The data were analysed by using both descriptive and inferential statistics. At the end of the study, Pamphlets were distributed to the control group. The association between the sleep quality of caregivers with demographic variables was analysed using the Chi-square test. P not less than 0.05 and considered statistically not significant in the study and control group.

## Results

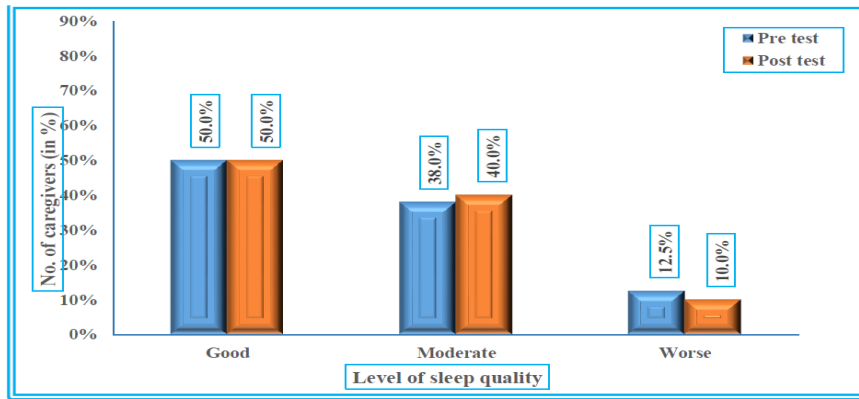
The result revealed that during the post-test 25 (62.5%) had good sleep quality The p-value of 0.001 is less than 0.01 and is highly significant at a 1% level hence it is concluded that there is a high significant difference between the mean sleep quality scores at post-test level in control and study groups. The mean scores of the post-test are lesser than the mean score of the pre-test and it is concluded that calisthenic exercise is effective in increasing sleep quality in the study group.

**Table 1.** Frequency and Percentage Distribution of Pre and Post Test Level of Sleep Quality Among Caregivers of Mentally Disabled Children in Control and Study Group

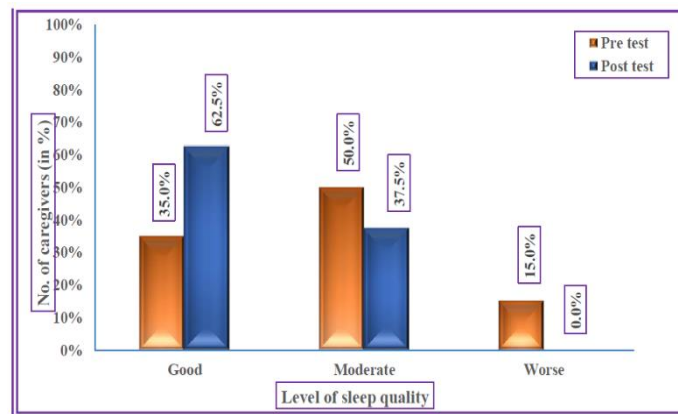
S. No	Level of Quality of Sleep	Control group				Study group			
		Pre-test		Post-test		Pre-test		Post-test	
		No.	%	No.	%	No.	%	No.	%
1.	Good	20	50.0	20	50.0	14	35.0	25	62.5
2.	Moderate	15	37.5	16	40.0	20	50.0	15	37.5
3.	Poor	5	12.5	4	10.0	6	15.0	0	0.0

The above table shows that in the control group, 5 (12.5%) of the caregivers of mentally disabled children had poor sleep quality, 15 (37.5%) had moderate sleep quality and 20 (50%) had good sleep quality in the pre-test whereas in posttest it was improved that 4 (10%) had poor sleep quality, 16 (40%) had moderate sleep quality and 20 (50%) had good sleep quality. (Figure 1). In the study group, 6

(15%) of the caregivers of mentally disabled children had poor sleep quality, 20 (50%) had moderate sleep quality and 14 (35%) had good sleep quality in the pretest whereas in the posttest it was improved that none of them had poor sleep quality, 15 (37.5%) had moderate sleep quality and 25 (62.5%) had good sleep quality. (Table 1) (Figure 2).



**Figure 1.** Pre and Posttest Level of Sleep Quality of Caregivers of Mentally Disabled Children in Control Group



**Figure 2.** Pre and Post-Test Level of Sleep Quality of Caregivers of Mentally Disabled Children in Study Group

**Table 2.** Effectiveness of Calisthenic Exercise on Sleep Quality of Pre-Test Level in Control and Study Group

S.NO	Level of sleep quality	Control group				Study group			
		Mean	SD	t value	p-value	Mean	SD	t value	p-value
1.	Pretest	4.75	1.032	0.000	1.000	4.60	1.215	3.665	0.001**
2.	Post-test	4.75	1.193			3.98	0.862		

P=0.001 S-Significant at 1% Level

The above table shows that the pre-test sleep quality mean score was 4.60 with SD 1.215 whereas the post-test sleep quality mean score was 3.98 with SD 0.862 which was statistically significant at a p-value 0.001 is less than 0.01

among the study group, this concludes that calisthenic exercise is more effective in increasing the sleep quality in any person following calisthenic exercise (Table 2).

**Table 3.** Comparison of Sleep Quality Scores with Control and Study Groups

Level of sleep quality	Mean	SD	t value	p value
Control group	4.75	1.193	3.330	0.001**
Study group	3.98	0.862		

The above table shows that the mean of the post-test score of the study group 3.98 is lesser than the mean of the post-test score of the control group 4.75. Also, the p-value 0.001 is less than 0.01 and the calculated value shows that there is a high significant difference

between mean sleep quality scores at post test level in the control and study group hence it is concluded that the calisthenic exercise given to the study group is effective in increasing the sleep quality (Table 3).

**Table 4.** Association Between the Demographic Variables of Caregivers and the Level of Sleep Quality at Post-Test Level in Control Group

S.No.	Demographic Variables of Caregivers	Class	Control group						$\chi^2$ df p-value
			Level of sleep quality						
			Poor		Moderate		Good		
No	%	No	%	No	%				
1	Age (in years)	20-30 years	4	10	12	30	7	17.5	$\chi^2=2.349$ df=2 p=0.309
		31-40 years	2	5	5	12.5	7	17.5	
		Above 60 years	0	0	1	2.5	2	5	
2	Gender	Male	1	2.5	4	10	5	12.5	$\chi^2=1.171$ df=1 p=0.279
		Female	5	12.5	14	35	11	27.5	
3	Religion	Hindu	6	15	15	37.5	15	37.5	$\chi^2=0.417$ df=1 p=0.519
		Christian	0	0	3	7.5	1	2.5	
5	Education	No formal Education	3	7.5	8	20	4	10	$\chi^2=2.937$ df=3 p=0.402
		Primary education	0	0	5	12.5	6	15	
		Higher Secondary Education	0	0	2	5	4	10	
		Graduate and Above	3	7.5	3	7.5	2	5	
6	Occupation	Unemployed	4	10	16	40	15	37.5	$\chi^2=0.417$ df=1 p=0.519
		Daily wages	2	5	2	5	1	2.5	
7	Habitat	Urban	5	12.5	5	12.5	3	7.5	$\chi^2=0.952$ df=1 p=0.329
		Rural	1	2.5	16	40	13	32.5	
8	History of hereditary illness	Thyroid	3	7.5	2	5	0	0	$\chi^2=1.404$ df=1 p=0.236
		None	3	7.5	18	45	14	35	
8	Number of children with mental disorder	One	6	15	19	47.5	11	27.5	$\chi^2=2.269$ df=1 p=0.132
		Two	0	0	1	2.5	3	7.5	

9	Consanguineous marriage	Yes	5	12.5	1	2.5	1	2.5	$\chi^2=0.088$ df=1 p=0.767
		No	1	2.5	18	45	14	35	
10	Relation of the caregiver to child	Mother	2	5	16	40	8	20	$\chi^2=2.639$ df=3 p=0.451
		Father	4	10	4	10	4	10	
		Grandfather	0	0	1	2.5	0	0	
		Grandmother	0	0	0	0	1	2.5	

\*\*Significant at 1% Level \*Significant at 5% Level

The above table shows that the p values corresponding to the demographic variables of caregivers of mentally disabled children are not less than 0.05 and the above findings show that

there is no significant association between the demographic variables of caregivers of mentally and the level of sleep quality in the control group (Table 4).

**Table 5.** Association Between the Demographic Variables of Caregivers and the Level of Sleep Quality at Post-Test Level in Study Group

S. No	Demographic Variables of Caregivers		Study group						$\chi^2$ df p Value
			Level of sleep quality						
			Poor		Moderate		Good		
			No.	%	No.	%	No.	%	
1	Age	20-30 years	1	2.5	5	12.5	7	17.5	$\chi^2=2.499$ df=4 P =0.645
		31-40 years	5	12.5	6	15	13	32.5	
		41-50 years	0	0	0	0	1	2.5	
		51-60 years	0	0	0	0	1	2.5	
		Above 60 years	0	0	0	0	1	2.5	
2	Gender	Male	1	2.5	2	5	10	25	$\chi^2=1.418$ df=1 P=0.234
		Female	5	12.5	9	22.5	13	32.5	
3	Religion	Hindu	6	15	10	25	20	50	$\chi^2=0.014$ df=1 P= 0.906
		Christian	0	0	1	2.5	3	7.5	
4	Education	No formal education	1	2.5	2	5	8	2	$\chi^2=2.813$ df=3 P= 0.421
		Primary education	0	0	2	5	1	2.5	
		Higher secondary education	0	0	2	5	6	15	
		Graduate and above	5	12.5	5	25	8	20	
5	Occupation	Unemployed	5	12.5	8	20	15	37.5	$\chi^2=1.308$ df=4 P= 0.860
		Daily wages	0	0	1	2.5	1	2.5	
		Private employed	1	2.5	2	5	5	12.5	

		Government employed	0	0	0	0	1	2.5	
		Retired	0	0	0	0	1	2.5	
6	Habitat	Urban	6	15	10	25	20	50	$\chi^2=0.014$ df=1 P=0.906
		Rural	0	0	1	2.5	3	7.5	
7	History of hereditary illness	Thyroid	0	0	0	0	1	2.5	$\chi^2= 0.389$ df=1 P=0.533
		None	6	15	11	27.5	22	55	
8	Number of children with mental disorder	One	5	12.5	10	25	19	47.5	$\chi^2=0.161$ df=1 P=0.688
		Two	1	2.5	1	2.5	4	10	
9	Consanguineous marriage	Yes	1	2.5	0	0	5	12.5	$\chi^2=2.167$ df=1 P=0.141
		No	5	12.5	11	27.5	18	45	
10	Relation for the caregiver to child	Mother	6	15	10	25	18	45	$\chi^2= 0.833$ df=3 P=0.841
		Father	0	0	1	2.5	3	7.5	
		Grandfather	0	0	0	0	1	2.5	
		Grandmother	0	0	0	0	1	2.5	

\*\*Significant at 1% Level \*Significant at 5% Level

The above table shows that the p values corresponding to the demographic variables of caregivers of mentally disabled children are not less than 0.05 and therefore the above findings show that there is no significant association between the demographic variables of caregivers of mentally and the level of sleep quality in the study group (Table 5).

## Discussion

Objective-1 To assess the pre-test level of sleep quality among caregivers of mentally disabled children in the control and study group. In the control group, 5 (12.5%) of the caregivers of mentally disabled children had poor sleep quality, 15 (37.5%) had moderate sleep quality, and 20 (50%) had good sleep quality in the pre-test, whereas in the post-test, 4 (10%) had poor sleep quality, 16 (40%) had moderate sleep quality, and 20 (50%) had good sleep quality. In the study group, 6 (15%) of the caregivers of mentally disabled children had poor sleep quality, 20 (50%) had moderate sleep quality, and 14 (35%) had good sleep

quality in the pre-test, whereas in the post-test, it was improved that none of them had poor sleep quality, 15 (37.5%) had moderate sleep quality, and 25 (62.5%) had good sleep quality.

Brian Lovell et al. (2021), conducted a study on caregivers of children with autism spectrum disorder. 43 caregivers were selected. Physical health problems were greater in caregivers, as were subjective reports of disturbed sleep. Objectively, waking after sleep onset (WASO) and average number of awakenings were higher, as was sleep latency, and sleep efficiency was poorer, in caregivers. Total sleep time, however, was greater in caregivers, as was time in bed. Physical health problems, while unrelated to actigraphy measures, were positively associated with self-reported sleep disturbances. Caregivers' increased risk for physical health problems occurred indirectly via greater self-reports of disturbed sleep [11].

Jiwon Lee (2013) states a literature review on Maternal stress, well-being, and impaired sleep in mothers of children with developmental disabilities, which included 28 scientific

research papers that examined maternal stress, sleep, and well-being in mothers of children with Developmental disabilities in the past 12 years. The study findings indicate that mothers of children with DDs experience higher levels of stress than mothers of typically developing children, and it remains high over time. In addition, these mothers often encounter depressive symptoms as well as poor sleep quality. Mothers of children with DDs with poor sleep quality are significantly associated with more depressive symptoms [12].

Atefeh Soltanifar (2015) measured parenting stress among fathers and moms of kids with ASD. According to the findings, there is a link between parental stress levels and how severe the illness is in the kids. The parental stress index was used to gauge the stress levels of 42 individuals. The findings demonstrate that parents of kids with ASD deal with a range of emotional demands that should be taken into consideration while coming up with effective treatment strategies for their children. Each of the three PSI subscales, including the PSI-child domain score ( $P = 0.005$ ), PSI-parent domain score ( $P = 0.005$ ), and total stress index ( $P = 0.005$ ), showed significant differences between fathers and mothers. Mothers experienced much more stress than fathers did [13].

Batool SS et al. (2015) pointed out the stressors that parents of autistic children encounter. 100 parents of autistic children—50 mothers and 50 fathers— participated in the study. Significant correlations were found between parenting stress and feeling coherent ( $r = -.26$ ,  $p.05$ ), parenting self-efficacy and parenting stress ( $r = -.35$ ,  $p.01$ ), and the degree of impairment ( $r = .53$ ,  $p.01$ ) [14].

Objective 2- To determine the effectiveness of calisthenic exercise on sleep quality among caregivers of mentally disabled children in the study group. The analysis revealed the effectiveness of calisthenic exercise on sleep quality in the control group; the p-value of 1.000 is not less than 0.05 and is not significant at the 5% level of significance. Whereas in the

study group, the p-value is 0.001, which is less than 0.01 and is highly significant at the 1% level.

Filiz (2008), conducted a study on Young, middle-aged, and menopausal women to see how a 12-week calisthenic exercise programme changed various physical and physiological traits. 60 women were selected and given calisthenic exercise training for 12 weeks. Variations in the growth of aerobic power, sit-up, push-up, and handgrip strength values were practised. The result shows that long-term calisthenic exercise causes improvements in physiological traits [15].

Colakoglu (2008) who conducted the study to determine the influence of inactive women's physical fitness on calisthenics states that a 12-week calisthenics workout course was completed by 172 participants. Each week, each study participant conducted three 50-minute sessions of aerobic and calisthenic exercise. There was a statistically significant difference in blood pressure reduction between Groups 1, II, and III ( $p = 0.05$ ). Calisthenics workouts are excellent for women of all ages, according to the findings[16].

Thomasa et al. (2017) assessed the benefits of callisthenics training on posture, strength, and body composition. The study group had better posture ( $p = 0.001$  with wide eyes and  $p = 0.05$  with closed eyes), strength ( $p = 0.01$  with a 16.4% rise and  $p = 0.0001$  with a 39.2% increase), body composition (14.8 5.1 vs. 11.4 5.9,  $p = 0.01$ ), and strength. The findings demonstrate that callisthenics training is a useful and effective training technique that may be used to enhance posture, strength, and body composition without the need for large training equipment [17].

## Conclusion

Mentally disabled children are those who have certain limitations in cognitive functioning and skills, including communication, social, and self-care skills. Neurodevelopmental disorders are a group of



mental disorders that affect the development of the nervous system, leading to abnormal brain function that may affect emotion, learning ability, self-control, and memory. The effects of neurodevelopmental disorders tend to last for a person's lifetime [18]. Scientific research reported that Calisthenic exercises are a group of simple exercises that raise the core body temperature and make you feel better because neurotransmitters are stimulated during exercise. Since it's believed that neurotransmitters mediate people's moods and emotions, they can make people feel better and less stressed. Callisthenics are exercises that rely solely on body weight for resistance and can be performed anywhere. No gym, no cash, no problem [19]. The caregivers of mentally

disabled children are more likely to develop stress from taking care of their children. It has affected their sleep and it has caused systemic illnesses in later life. This study proved calisthenic exercise was more effective in improving sleep quality and preventing health issues in later life for caregivers of mentally disabled children [20].

## Conflict of Interest

Nil.

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## References

- [1]. Marcinik, E. J., Hodgdon, J. A., Mittleman, K. A., O'Brien, J. J., 1985, Aerobic/Calisthenic and Aerobic/Circuit Weight Training Programs for Navy Men: A Comparative Study, *Med Sci Sports Exerc.*, Aug 1;17(4), 482-7.
- [2]. Wadoo, O., Shah, A. J., Sajjad, A., Fearnley, D., 2010, Management and Medical Leadership–Evaluation of Training Needs and Pathways, *British Journal of Medical Practitioners*, Dec1;3(4), 341.
- [3]. Penzel, T., Hornero, R., 2018, Advances in the Diagnosis and Treatment of Sleep Apnea: Filling the Gap Between Physicians and Engineers.
- [4]. Iranzo, A., De Cock, V. C., Fantini, M. L., Pérez-Carbonell, L., & Trotti, L. M., 2023, Sleep and Sleep Disorders in People With Parkinson's Disease. *The Lancet Neurology*.
- [5]. Joshua, C., Hollingsworth, Saloni Dattani, Hannah Ritchie and Max Roser, 2020, Mental Health. Published Online at Our World in Data, Apr 28;8:128.
- [6]. Wittenberg, E., Goldsmith, J., Ragan, S. L., Parnell, T. A., 2020, Caring for the Family Caregiver. *Oxford University Press*, Sep 1.
- [7]. Mulani, J., Jain, J., Gupta, A., Swamidas, J., Paul, S., Mittal, P., Gurram, L., Chopra, S., Dose. 2022, A Cumulation for Multicourse Gynecological Reirradiation: A Methodological Narrative and Clinical Examples. *International Journal of Radiation Oncology \*Biology\* Physics*, Aug 1;113(5):1085-90.
- [8]. Sabih, F., Sajid, W. B., 2008, There is Significant Stress Among Parents Having Children with Autism. *Rawal Medical Journal*, Oct;33(2):214-6.
- [9]. Magnúsdóttir, I., Lovik, A., Unnarsdóttir, A. B., McCartney, D., Ask, H, Köiv, K., Christoffersen, L. A., Johnson, S.U., Hauksdóttir, A., Fawns-Ritchie, C., Helenius, D., 2022, Acute Covid-19 Severity and Mental Health Morbidity Trajectories in Patient Populations of Six Nations: an Observational Study. *The Lancet Public Health*. May 1;7(5): e406-16.
- [10]. Mohamad Aun, N. S, Zakaria, S. M, Ahmad Badayai, A. R, Idris, I. B, Mohd Daud, T. I, Mohd Fazree, S. D., 2022, Quality of Life among Mothers of High Functioning Autism Spectrum Disorder Adolescents. *Int J Environmental Res Public Health*. May;30;19(11).
- [11]. Lovell, B., Elde, G. J., Wetherell, M. A., 2021, Sleep Disturbances and Physical Health Problems in Caregivers of Children With ASD, *Research in Developmental Disabilities*. Jun 1;113:103932.
- [12]. Lee, J., 2013, Maternal Stress, Well-Being, and Impaired Sleep in Mothers of Children with Developmental Disabilities, A Literature Review,

*Research in Developmental Disabilities*. Nov 1;34(11):4255-73.

[13]. Soltanifar, A., Akbarzadeh, F., Moharreri, F., Soltanifar, A., Ebrahimi, A., Mokhber, N., Minoocherhr, A., Naqvi, S. S., 2015, Comparison of Parental Stress Among Mothers and Fathers of Children with Autistic Spectrum Disorder in Iran. *Iranian Journal of Nursing and Midwifery Research*, Jan;20(1):93.

[14]. Batool, S. S, Khurshid, S., 2022, Factors Associated with Stress Among Parents of Children with Autism. *Journal of the College of Physicians and Surgeons Pakistan*, Oct 1;25(10):752-6.5.

[15]. Filiz., 2008, The Effect of Calisthenic Exercise on Physical Fitness Values of Sedentary Women, *Science & Sports*, Dec 1;23(6):306-9.

[16]. Colakoglu, S., Caligiuri, P., 2008, Cultural Distance, Expatriate Staffing and Subsidiary Performance, The Case of US Subsidiaries of Multinational Corporations. *The International Journal of Human Resource Management*, Feb 1;19(2):223-39.

[17]. Thomas, E., Bianco, A., Mancuso, E. P., Patti, A., Tabacchi, G., Paoli, A., Messina, G., Palma, A., 2017, The Effects of a Calisthenics Training Intervention on Posture, Strength and Body Composition, *Isokinetics and Exercise Science*, Jan 1;25(3):215- 220.

[18]. Hodgetts, S., McConnell, D., Zwaigenbaum, L., Nicholas, D., 2017, The Impact of Autism Services on Mothers' Psychological Wellbeing. *Child: Care, Health and Development*, Jan;43(1):18-30.

[19]. Cramm, J. M., Nieboer, A., 2011, Psychological Well-Being of Caregivers of Children with Intellectual Disabilities: Using parental stress as a mediating factor. *Journal of Intellectual Disabilities*, Jun;15(2):101-13.

[20]. Tsourlou, T., Gerodimo, V., Kellis, E., Stavropoulos, N., Kellis, S., 2003, The Effects of a Calisthenics and a Light Strength Training Program on Lower Limb Muscle Strength and Body Composition in Mature Women. *The Journal of Strength & Conditioning Research*, Aug 1;17(3), 590-8.